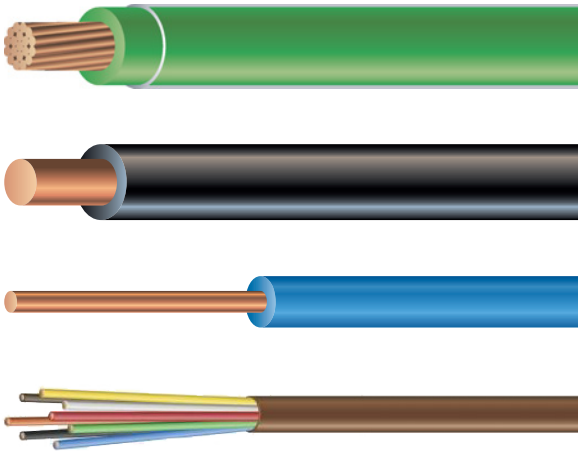
Southwire

CABLETECH SUPPORT™ Services

LEAD WIRE

MAXIMUM CURRENT CAPACITY (AMPACITY)

LEAD WIRE



The lead wire product grouping at Southwire is made up of insulated single and multi-conductor low voltage wire and cable products used in a variety of applications including control panels, appliances, electronic equipment, automotive and industrial equipment harnesses, and specialty applications such as welding, HVAC, and pump & irrigation.

Commonly referred to as: motor lead wire, hook-up wire, automotive cable, battery cable, trailer cable, brake cable, welding cable, thermostat wire, pump cable, irrigation (sprinkler wire/tracer wire), or low voltage landscape lighting.

CODE OR INDUSTRY STANDARD

Currently there is not a published code document and no industry standard that covers the maximum current capacity for hook-up and lead wires.

CURRENT CARRYING CAPACITY (AMPACITY)

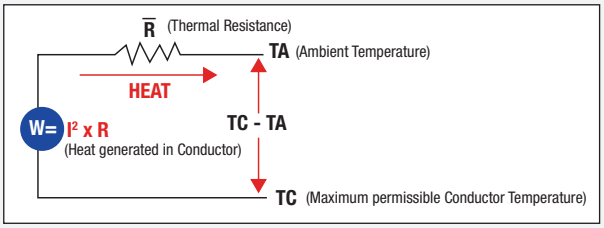
Current carrying capacity is defined as the continuous current which, when passed through a wire, will increase the temperature of the conductor from a specific ambient temperature to the maximum temperature rating of the insulation.

The maximum current capacity in the wire can be calculated using the heat-transfer formula developed by J.H Neher and M.H. McGrath. The formula is a series of heat-transfer calculations taking into account all heat sources and the thermal resistances.

$$I = \sqrt{\frac{TC - TA}{R \times RCA}}$$

Equation No. 1

Letting heat, IxIxR in this case, be represented by W and thermal resistance, RCA, by R with a line over it, we can draw a thermal circuit that is similar to an electrical circuit.



$$TC - TA = W \times \overline{R}$$

The selection of the cable size based in the current capacity depends on many variables like temperature, limitations of insulation, voltage drop, location or installation of the wires in free air or enclosed, single or bundle wires, etc.

Southwire has created the following ampacity tables for hook-up and lead wires based on the standard installation conditions indicated using the thermal method Neher-McGrath. However, it is important to highlight that these numbers were calculated assuming some variables and, in many cases, do not represent the installation conditions for the hook-up or lead wires.

The following tables are only applicable for hook-up and lead wire products and are valid for all voltage levels of these products.

Date:	Spec No.:	Customer:
Prepared by:	Job Name:	

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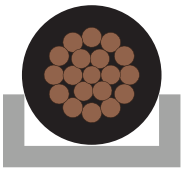

- **Table 1** - Maximum current capacity (Amperes) for a single copper conductor in free air with ambient temperature of 30°C (86°F). Shaded cables.

AWG/KCMIL	60°C	75°C	90°C	105°C	125°C	150°C	200°C	250°C
22	7	8	10	11	13	14	15	17
20	9	11	13	14	16	18	20	22
18	12	14	17	19	22	23	26	29
16	15	19	22	24	28	31	34	37
14	21	25	30	33	38	41	46	51
12	27	33	39	43	49	54	60	66
10	36	45	52	59	67	74	81	90
8	50	63	74	83	93	104	113	125
6	71	88	103	115	129	143	156	173
4	95	118	138	154	173	192	210	233
2	129	160	186	209	234	261	286	316
1	152	190	221	247	277	309	338	374
1/0	167	209	243	272	297	331	348	385
2/0	200	249	289	323	355	394	415	459
3/0	234	292	338	379	414	462	486	538
4/0	274	341	396	443	486	540	570	630
250	308	383	446	498	546	607	639	706
350	380	473	551	616	674	751	791	874
400	419	522	607	679	743	827	872	963
500	486	607	705	788	864	963	1015	1122
750	626	781	909	1017	1115	1242	1310	1450

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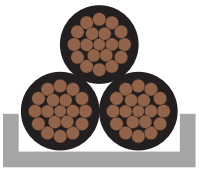

- **Table 2** - Maximum current capacity (Amperes) for not more than three (3) copper conductors in free air with ambient temperature of 30°C (86°F). Shaded cables.

AWG/KCMIL	60°C	75°C	90°C	105°C	125°C	150°C	200°C	250°C
22	5	6	7	8	9	10	11	12
20	6	8	9	10	12	13	14	15
18	8	11	13	14	15	17	19	21
16	12	14	16	18	20	23	25	27
14	14	18	22	24	27	30	33	37
12	19	24	28	32	35	40	43	48
10	27	32	38	43	48	54	60	65
8	38	47	55	61	68	77	84	94
6	53	67	77	86	97	108	119	132
4	71	89	104	116	131	146	160	178
2	96	121	141	158	177	198	218	241
1	114	144	167	188	211	236	259	287
1/0	128	160	186	209	230	256	270	300
2/0	153	191	222	249	274	305	323	358
3/0	179	223	261	292	320	357	378	419
4/0	209	262	305	342	376	419	443	492
250	238	297	346	388	426	475	502	557
350	293	365	427	478	525	587	620	689
400	320	401	469	526	578	646	684	759
500	370	464	542	608	670	749	794	882
750	471	592	692	779	858	962	1024	1140

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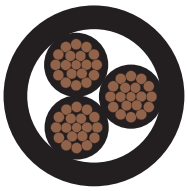

- **Table 3 -** Maximum current capacity (Amperes) for not more than three (3) copper conductors in a cable with ambient temperature of 30°C (86°F). Shaded cables.

AWG/KCMIL	60°C	75°C	90°C	105°C	125°C	150°C	200°C	250°C
22	5	6	7	8	9	10	11	12
20	6	8	9	10	12	13	14	15
18	8	11	13	14	15	17	19	21
16	11	14	15	17	19	22	24	27
14	14	18	21	23	26	29	32	36
12	19	23	27	30	33	37	41	46
10	26	32	37	40	44	50	54	61
8	35	44	50	53	59	67	74	82
6	48	59	68	72	81	91	100	112
4	62	76	88	94	105	118	131	147
2	81	101	117	124	140	156	173	195
1	93	115	134	142	159	179	199	222
1/0	112	139	161	170	187	209	224	250
2/0	131	162	188	199	219	245	262	294
3/0	151	187	218	230	253	283	304	341
4/0	173	215	249	265	291	326	350	392
250	202	251	292	310	341	381	408	458
350	244	303	352	374	412	461	494	556
400	264	329	383	407	448	502	539	606
500	299	372	434	462	510	572	614	691
750	364	455	531	566	627	706	761	858

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• **Table 4 -** Correction factors for other temperatures

AMBIENT TEMP (°C)	INSULATION TEMPERATURE LEVEL							
	60°C	75°C	90°C	105°C	125°C	150°C	200°C	250°C
30	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
40	0.82	0.88	0.91	0.92	0.95	0.96	0.97	0.98
50	0.58	0.75	0.81	0.82	0.89	0.91	0.94	0.96
60	-	0.58	0.70	0.73	0.83	0.86	0.91	0.93
70	-	0.33	0.55	0.61	0.76	0.81	0.87	0.91
80	-	-	0.38	0.46	0.69	0.76	0.84	0.88
90	-	-	-	0.30	0.61	0.70	0.80	0.85
100	-	-	-	-	0.51	0.63	0.76	0.83
120	-	-	-	-	-	0.48	0.68	0.77
140	-	-	-	-	-	0.26	0.58	0.70
160	-	-	-	-	-	-	0.47	0.63
180	-	-	-	-	-	-	0.32	0.56
200	-	-	-	-	-	-	-	0.47

For ambient temperatures over 30°C, multiply the ampacities shown in Table 1, Table 2, or Table 3 by the appropriate correction factor to determine the maximum current capacity.

• **Table 5 -** Correction factors for more than three conductors in a cable

NUMBER OF CONDUCTORS	REDUCTION FACTOR
4 – 6	0.80
7 – 9	0.70
10 – 20	0.50
21 – 30	0.45
31 – 40	0.40
41 and above	0.35

If more than three (3) conductors are in air or cable, the values given in Table 2 and Table 3 must be reduced using the correction factors.

Tables 4 and 5 are based on the NEC® 2020.

The above ampacity numbers are for reference only. For installation conditions other than those shown, please contact **CableTechSupport@southwire.com** or **IWCableTechsupport@southwire.com**.

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